

## PATENT COOPERATION TREATY

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From the INTERNATIONAL SEARCHING AUTHORITY JAN 23 2007

PCT

## To:

BLAKELY, SOKOLOFF, TAYLOR  
& ZAFMAN LLP  
Attn. Vincent, Lester J.  
12400 Wilshire Boulevard, 7th floor  
Los Angeles, CA 90025  
ETATS-UNIS D'AMERIQUE

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
NOTIFICATION OF TRANSMITTAL OF  
THE WRITTEN OPINION OF THE INTERNATIONAL  
SEARCHING AUTHORITY, OR THE DECLARATION

JAN 23 2007

LA F/F DEPT.

(PCT Rule 44.1)

ENTERED

Date of mailing  
(day/month/year)

17/01/2007

Applicant's or agent's file reference

JAN 23 2007

P21096PCT

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US2006/024516

STATUS DB/LA

International filing date

(day/month/year)

20/06/2006

Applicant

INTEL CORPORATION

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

## Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

## 4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the PCT Applicant's Guide, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
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Authorized officer

John Bakvis

## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

#### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

#### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

#### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments?

##### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P21096PCT</b>	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, Item 5 below.	
International application No. <b>PCT/US2006/024516</b>	International filing date (day/month/year) <b>20/06/2006</b>	(Earliest) Priority Date (day/month/year) <b>21/06/2005</b>
Applicant  <b>INTEL CORPORATION</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☒ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant  
☐ the text has been established by this Authority to read as follows:

NO DOCKETING REQUIRED

NA

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant  
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 5  
☐ as suggested by the applicant  
☒ as selected by this Authority, because the applicant failed to suggest a figure  
☐ as selected by this Authority, because this figure better characterizes the invention  
b. ☐ none of the figures is to be published with the abstract

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/024516

## A. CLASSIFICATION OF SUBJECT MATTER

INV. H01L21/306 H01L21/336 H01L21/84 H01L29/786 H01L29/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JAE-HYOUN PARK ET AL: "Quantum-wired MOSFET photodetector fabricated by conventional photolithography on SOI substrate" NANOTECHNOLOGY, 2004. 4TH IEEE CONFERENCE ON MUNICH, GERMANY 16-19 AUG. 2004, PISCATAWAY, NJ, USA, IEEE, 16 August 2004 (2004-08-16), pages 425-427, XP010767302 ISBN: 0-7803-8536-5 paragraph [00II]; figure 1	1-16
X	US 5 739 544 A (YUKI KOICHIRO [JP] ET AL) 14 April 1998 (1998-04-14) figures 21A-21G; example 11 figures 40A-40E; example 23 ----- -/-	1-9, 13-16

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

9 January 2007

Date of mailing of the international search report

17/01/2007

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Szarowski, Anne

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/024516

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 156 149 A (PHILIPS ELECTRONIC ASSOCIATED) 2 October 1985 (1985-10-02) page 2, line 122 - page 3, line 50; figures 1,2 page 3, line 128 - page 4, line 8 -----	1-9, 13-16
X	JP 59 145538 A (HITACHI LTD) 21 August 1984 (1984-08-21) page 165, right-hand column - page 166, left-hand column; figures 1-3 -----	1-9, 13-16
X	US 5 543 351 A (HIRAI YOSHIHIKO [JP] ET AL) 6 August 1996 (1996-08-06) column 2, line 63 - column 6, line 14; figures 2A-2D, 4A-4G -----	1-9, 13-16
X	JP 02 303048 A (NISSAN MOTOR) 17 December 1990 (1990-12-17) pages 253-255; figures 1,3,5,7 -----	1-9, 13-16
A	DE 102 03 998 A1 (INFINEON TECHNOLOGIES AG [DE]) 21 August 2003 (2003-08-21) paragraph [0032] -----	14-16
X	CHANG L ET AL: "CMOS CIRCUIT PERFORMANCE ENHANCEMENT BY SURFACE ORIENTATION OPTIMIZATION" IEEE TRANSACTIONS ON ELECTRON DEVICES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 51, no. 10, October 2004 (2004-10), pages 1621-1627, XP001211140 ISSN: 0018-9383 paragraphs [00IV] - [00VI] -----	17-21
X	US 6 867 460 B1 (ANDERSON BRENT A [US] ET AL) 15 March 2005 (2005-03-15) column 3, line 42 - column 5 -----	17-21
X	US 2004/119100 A1 (NOWAK EDWARD J [US] ET AL) 24 June 2004 (2004-06-24) paragraphs [0023] - [0035] -----	17-21

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2006/024516

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-16

A method of patterning a semiconductor film.  
A method of patterning a monocrystalline silicon film.  
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2. claims: 17-21

An integrated circuit.  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/024516

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5739544	A	14-04-1998	NONE	
GB 2156149	A	02-10-1985	NONE	
JP 59145538	A	21-08-1984	JP 1745703 C JP 4027704 B	25-03-1993 12-05-1992
US 5543351	A	06-08-1996	NONE	
JP 2303048	A	17-12-1990	JP 2553702 B2	13-11-1996
DE 10203998	A1	21-08-2003	NONE	
US 6867460	B1	15-03-2005	NONE	
US 2004119100	A1	24-06-2004	AU 2003293380 A1 CN 1726595 A EP 1573823 A1 JP 2006511962 T KR 20050085052 A TW 239630 B WO 2004061972 A1	29-07-2004 25-01-2006 14-09-2005 06-04-2006 29-08-2005 11-09-2005 22-07-2004



# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/JS2006/024516

International filing date (day/month/year)  
20.06.2006

Priority date (day/month/year)  
21.06.2005

International Patent Classification (IPC) or both national classification and IPC  
INV. H01L21/306 H01L21/336 H01L21/84 H01L29/786 H01L29/04

Applicant  
INTEL CORPORATION

### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Date of completion of  
this opinion

see form  
PCT/ISA/210

Authorized Officer

Szarowski, Anne

Telephone No. +31 70 340-4526



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2006/024516

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of:
  - ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ on paper
    - ☐ in electronic form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in electronic form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2006/024516

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**Box No. IV Lack of unity of invention**

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1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☒ paid additional fees
  - ☐ paid additional fees under protest and, where applicable, the protest fee
  - ☐ paid additional fees under protest but the applicable protest fee was not paid
  - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos.

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**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	3,7,9,14-16
	No: Claims	1,2,4-6,8,10-13,17-21
Inventive step (IS)	Yes: Claims	none
	No: Claims	1-21
Industrial applicability (IA)	Yes: Claims	1-21
	No: Claims	none

2. Citations and explanations

**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

The separate groups of inventions are:

I: claims 1-16;

II: claims 17-21.

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The first set of claims deals with methods of etching a semiconductor film, wherein the processes are not specially adapted for the manufacture of the product (i.e. the circuit) defined in the second set of claims.

The processes of claims 1 and 4 result in the manufacture of a product having an etched semiconductor film wherein specific crystalline planes are revealed (e.g. <111> planes) thereby creating a predetermined structure (e.g. tapered sidewalls). The product of claim 17 is a circuit having two semiconductor patterns (the non-planar transistors), wherein no specific structures are defined and charge migration is along two different directions. Said processes do not inherently result in said product.

Additionally, the product of claim 17 cannot result from the mere application of the methods of claims 1 or 4.

The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

D1: JAE-HYOUN PARK ET AL: "Quantum-wired MOSFET photodetector fabricated by conventional photolithography on SOI substrate" NANOTECHNOLOGY, 2004. 4TH IEEE CONFERENCE ON MUNICH, GERMANY 16-19 AUG. 2004, PISCATAWAY,

- NJ, USA, IEEE, 16 August 2004 (2004-08-16), pages 425-427, XP010767302 ISBN: 0-7803-8536-5
- D2: US-A-5 739 544 (YUKI KOICHIRO [JP] ET AL) 14 April 1998 (1998-04-14)
- D3: GB-A-2 156 149 (PHILIPS ELECTRONIC ASSOCIATED) 2 October 1985 (1985-10-02)
- D4: JP 59 145538 A (HITACHI LTD) 21 August 1984 (1984-08-21)
- D5: US-A-5 543 351 (HIRAI YOSHIHIKO [JP] ET AL) 6 August 1996 (1996-08-06)
- D6: JP 02 303048 A (NISSAN MOTOR) 17 December 1990 (1990-12-17)
- D7: DE 102 03 998 A1 (INFINEON TECHNOLOGIES AG [DE]) 21 August 2003 (2003-08-21)
- D8: CHANG L ET AL: "CMOS CIRCUIT PERFORMANCE ENHANCEMENT BY SURFACE ORIENTATION OPTIMIZATION" IEEE TRANSACTIONS ON ELECTRON DEVICES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 51, no. 10, October 2004 (2004-10), pages 1621-1627, XP001211140 ISSN: 0018-9383
- D9: US-B1-6 867 460 (ANDERSON BRENT A [US] ET AL) 15 March 2005 (2005-03-15)
- D10: US 2004/119100 A1 (NOWAK EDWARD J [US] ET AL) 24 June 2004 (2004-06-24)

**I: Claims 1-16**

**1. Claims 1-3**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 2 is not new in the sense of Article 33(2) PCT.

D1 discloses (paragraph II; fig.1) a method comprising:

- forming a hard mask (i.e. silicon nitride and silicon dioxide) on a (100) silicon film;
- dry etching said film and said hard mask material into a hard mask covered silicon structure; and
- anisotropically wet etching said structure using TMAH.

As D1 discloses (see p.426, first three lines and fig.1) wet etching thereby forming a reverse shape "because of the different anisotropic etch-rate as a silicon plane" there is no doubt that the hard mask is formed on a plane less dense than the (111) plane and that said (111) plane is revealed.

Additionally, the subject-matter of claims 1 and 2 is also not new with respect to D2-D4.

D2 discloses (example 11; fig. 21A-21G) a method comprising:

- forming a hard mask material on a (100) silicon film wherein said hard mask is formed to be parallel or perpendicular to the  $\langle 110 \rangle$  direction;
- dry etching said silicon film and said hard mask material into a hard mask covered silicon structure; and
- anisotropically wet etching said structure with an EDP solution, said etching having sufficient chemical strength to etch the (110) plane but insufficient chemical strength to etch the (111) plane (said etching is self-limiting and stops on the first contiguous 111 crystalline plane).

D2 also discloses (example 23; fig. 40A-40E) a method wherein a (110) silicon film is etched.

D3 discloses (fig.1, 2; p.2, line 122 - p.3, line 50) a method comprising:

- forming a hard mask material on a (110) silicon film;
- dry etching said silicon film and said hard mask material into a hard mask covered silicon structure having (100) sidewalls; and
- anisotropically wet etching said structure using for example a KOH solution, said etching stopping on the (111) planes.

D3 also discloses (p.3, line 128 - p.4, line 8) a method wherein a (100) silicon film is first etched to form a structure with (110) sidewalls.

D4 discloses (p.165, right-hand column to p.166, upper left-hand column) a method comprising:

- forming an oxide hard mask (4) on a (100) silicon film (3);
- dry etching said film into a hard mask covered structure; and
- anisotropically wet etching said structure using an alkaline solution.

Independently of what has been stated above, the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT with respect to D5 or D6.

D5 discloses (fig. 2A-2D; fig. 4A-4G; col.2, line 63 - col.6, line 14) a method comprising:

- dry etching a (100) silicon substrate with a hard mask aligned in the  $\langle 110 \rangle$  direction to

form a hard mask covered silicon structure; and

- anisotropically wet etching said structure, said etching stopping on the (111) planes.

D6 discloses (p. 253-255; fig. 1,4,5,7) a method comprising:

- dry etching a (100) silicon substrate with a hard mask aligned in the <110> direction to form a hard mask covered silicon structure; and
- anisotropically wet etching said structure with a KOH solution, said etching stopping on the (111) planes.

D6 also discloses a method wherein a (110) silicon film is etched.

The skilled person would naturally consider applying the methods of D5 or D6 to silicon layers having the same crystalline orientation as the silicon substrates of said documents.

Dependent claims 2, 3 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (see above) and/or inventive step (Art.33(3) PCT):

The skilled person would apply the teachings of D1-D6 to germanium as Ge is a IV element having the same diamond structure as Si. The same would also naturally apply to a silicon germanium alloy.

Identically, the skilled person would consider III-V compounds such as GaAs, InSb, GaP, and GaSb as said compounds have a zinc-blend structure which is similar to the diamond one of Si.

## **2. Claims 4-16**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 4-6, 8, 10-13 is not new in the sense of Article 33(2) PCT:

- claims 4,5,10-13: see D1;
- claims 4,5,6,8,13: see D2, D3;
- claims 4,5,13: see D4.

Independently of what has been stated above, the subject-matter of claim 4 does not involve an inventive step in the sense of Article 33(3) PCT with respect to D5 or D6.

As far as claims 15 and 16 can be understood (see below), dependent claims 5-16 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (see above) and/or inventive step (Art.33(3) PCT):

- claims 7, 9: the skilled person would consider aligning the hard mask with other directions thereby forming structures with sidewalls aligned with a (100) or (110) plane;
- claim 16: it is commonly known that  $\text{NH}_4\text{OH}$  solutions result in crystalline anisotropic etching of silicon (see for example D7, par.32). The skilled person would naturally envisage replacing the wet etchants of D1-D6 by an  $\text{NH}_4\text{OH}$  alternative solution.

### **3. Art.6 PCT**

Although claims 1 and 4 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

The application does not meet the requirements of Article 6 PCT, because claims 15 and 16 are not clear. The reader is left in doubt as to the composition of the etchant as  $\text{NH}_4\text{OH}$  is the name given to an *aqueous* solution of *ammonia*.

4. Claims 1-16 satisfy the requirements of Article 33(4) PCT.

## **II: Claims 17-21**

1. As far as claims 20 and 21 can be understood (see below), the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 17-21 is not new in the sense of Article 33(2) PCT.

D8 discloses (par. IV-VI) an integrated circuit comprising:

- a first nonplanar transistor, i.e. an n type field effect transistor, having a first semiconductor body, i.e. a single crystalline silicon film, wherein charge migration in said first semiconductor body is along a first direction, i.e.  $\langle 100 \rangle$ ; and
- a second nonplanar transistor, i.e. a p type field effect transistor, having a second semiconductor body, i.e. a single crystalline silicon film, wherein charge migration in said



second semiconductor body is along a second direction, i.e. <110>.

Additionally, the subject-matter of claims 17-21 is also not new with respect to D9 (see col.3, line 42 - col.5) and D10 (see par. 23-35).

**2. Art.6 PCT**

The application does not meet the requirements of Article 6 PCT, because claims 20 and 21 are not clear; see description par.43 & fig.5.

**3. Claims 17-21 satisfy the requirements of Article 33(4) PCT.**

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